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(54) Building panels and building
constructions

(57) The panel comprises a water-
impervious first rectangular sheet 11, a
thicker, shorter and narrower second
sheet 12, preferably polystyrene foam,
and a third sheet 13 that is thinner
than second sheet 12 and of the same
height and width as first sheet 11.
Second sheet 12 adheres to and is

sandwiched between the first and
third sheets, and a U-section member
14, preferably sheet metal, is affixed
to each side edge of the second sheet
along its full height and opens
outward to engage a similar U-shaped
member of an adjacent panel in order
to secure the two panels together with
the respective first and third sheets of
the panels abutting and flush with one
another.

The panels may be arranged
between a floor ridge member 22 and
a top plate 23, each of 22 and 23
fitting between sheets 11 and 13, and
23 being connected to 22 by tie-rod
24 through a U-member 25.

The drawings originally filed
were informal and the print
here reproduced is taken from a
later filed formal copy.

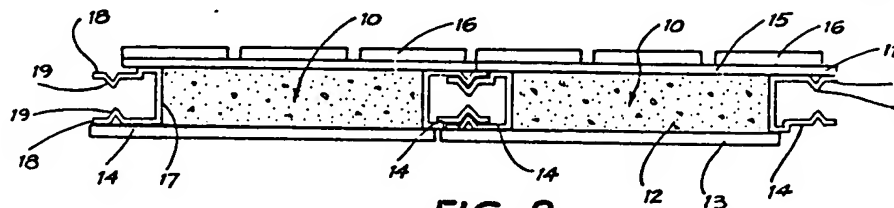


FIG. 2

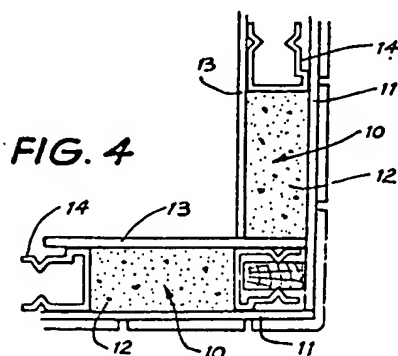


FIG. 4

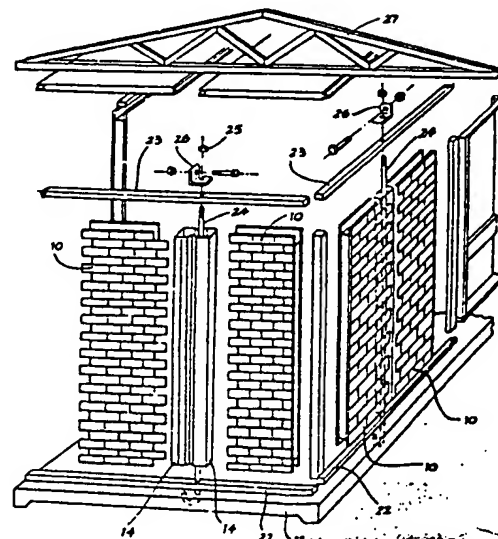


FIG. 5

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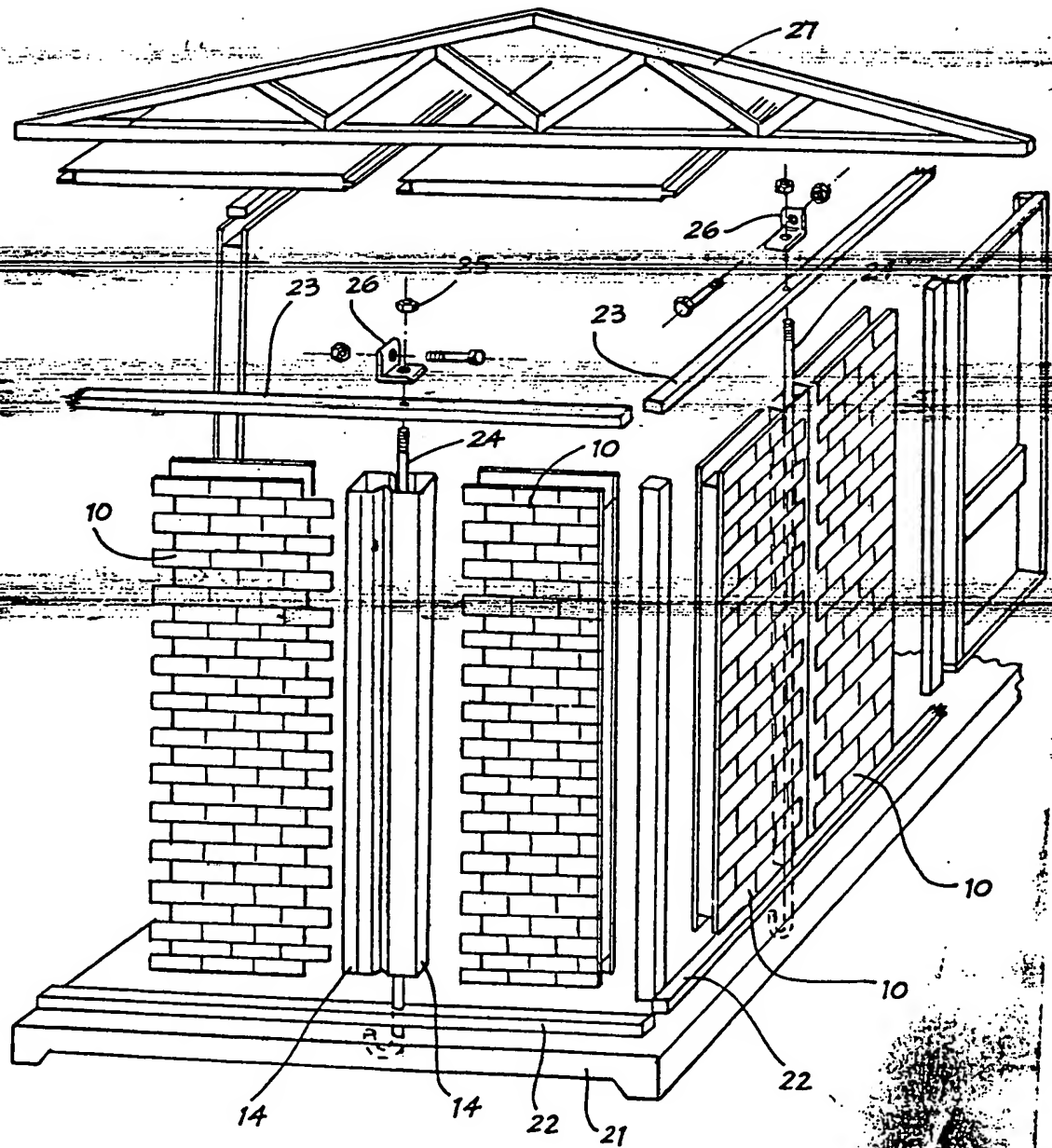
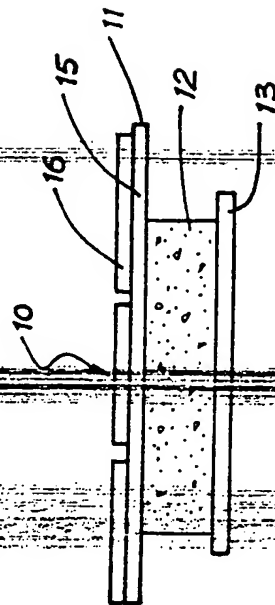
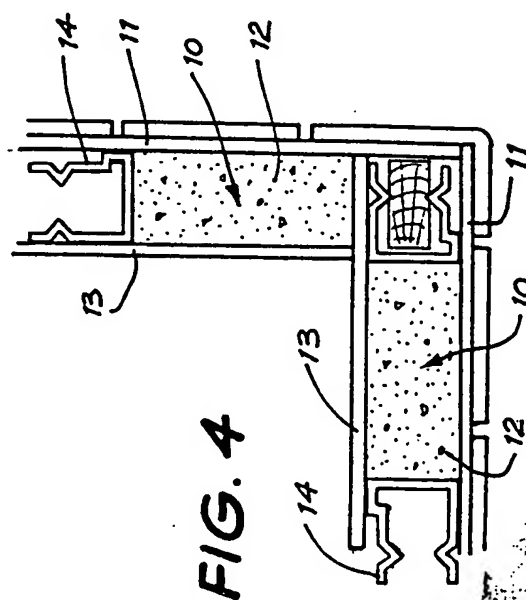
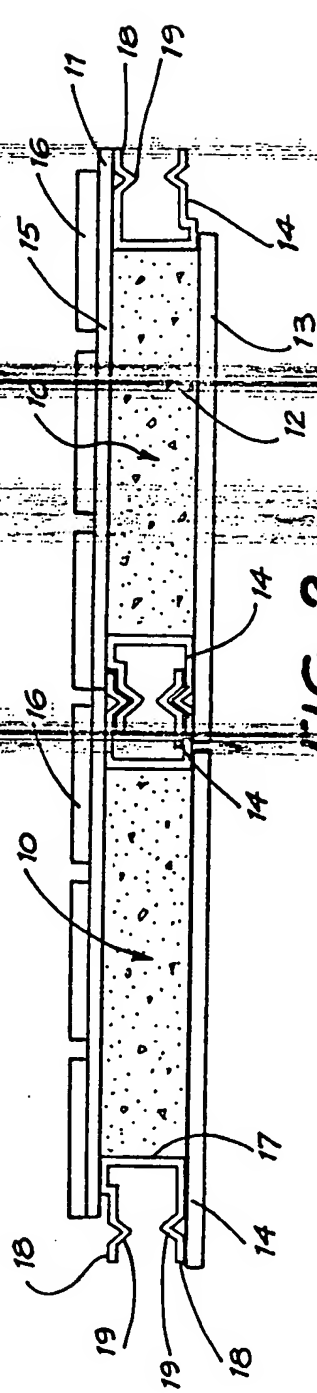


FIG. 5

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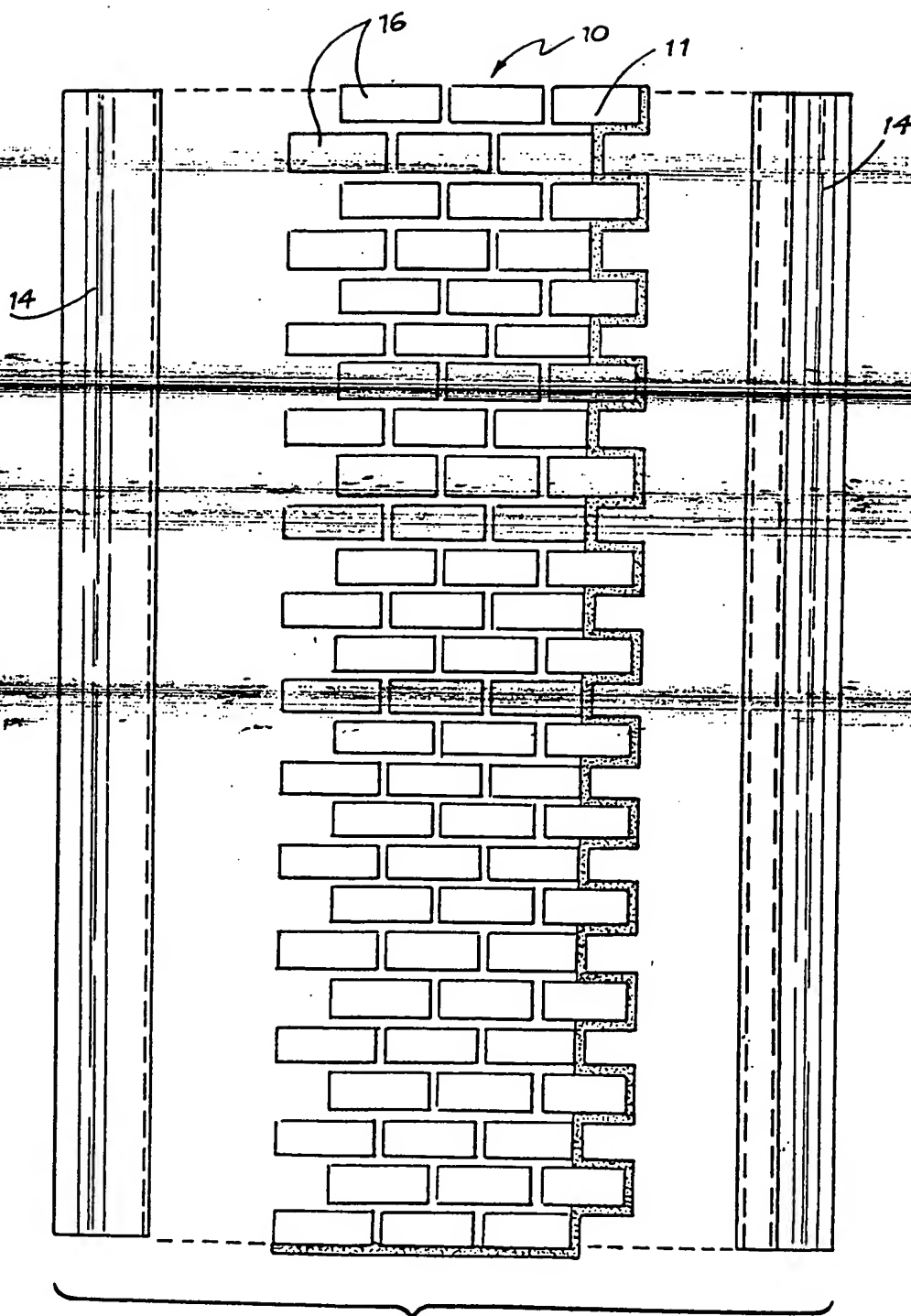


FIG. 1

SPECIFICATION

Improved manufacture of lightweight building components together with their method and means for use in construction

- 5 The present invention relates to an improved building panel and to a building structure incorporating such panels.

It has long been recognised that traditional building practices are inefficient and costly and numerous proposals have been made for the manufacture of prefabricated building panels to facilitate the construction of buildings more efficiently and more cheaply than by conventional building practices. United States patent specification 3,719,016 describes a building panel comprising two fibreglass walls spaced apart by insulating material with offset flanges for

interlocking with an adjacent panel. The present invention is directed to an alternative form of building panel which may be formed more readily and may be interlocked more satisfactorily than with the prior art arrangements.

The present invention consists in a building panel comprising a first substantially rectangular sheet of a water impervious material; a second sheet of insulating material adhered to one face of the first sheet, the second sheet being substantially thicker than the first sheet and being shorter and narrower than the first sheet; a third sheet adhered to the face of the second sheet distal to the first sheet, the third sheet being substantially thinner than the second sheet and being of the same height and effective width as the first sheet; and a pair of substantially U-section members, one of which is connected to each side edge of the second sheet between the first and third sheets and extending along substantially the full height of the said second sheet, the U-section members each opening outwardly of the second sheet and being formed with longitudinally extending engagement means to engage with a corresponding engagement means on the U-section member of another building panel to hold the panels in edge to edge engagement with the respective first and third sheets of the panels abutting and flush with one another.

The present invention further consists in a building construction comprising a floor having longitudinally extending upstanding ridges corresponding to the positions of the walls of the building construction and a plurality of building panels according to this invention disposed above the said ridges with the first and third sheets of the building panel engaging the floor and bounding a ridge on each side, adjacent building panels abutting with one another with the engagement means of the adjacent U-section members in engagement with one another, a top plate extending along the length of the walls and being received between the first and third sheets of each building panel, each top plate being interconnected with the corresponding ridge by elongate rod members extending longitudinally

- 65 with a U-shaped member of one of the building panels.

The first sheet is preferably formed on its outer surface with an array of brick like tiles disposed in a conventional brick work array. Each brick tile is preferably separated from each adjacent brick tile by a mortar line pattern. The bricks in each adjacent course are preferably offset relative to one another by half a brick tile length and the side edges of the first sheet are preferably recessed every second course down each vertical edge such that the side edges of the first sheet correspond to the pattern of the brick tiles. In such an arrangement the adjacent edges of two building panels will interdigitate with one another and the continuity of the brick work pattern will thereby be continued across the join between the adjacent building panels.

The brick tiles are preferably formed by pouring a slurry of natural granular materials such as crushed brick, clay, sand, marble, dust and the like mixed with chemical adhesive into a pre-casted mould having the exact dimension of the required wall component. The brick tiles preferably have a thickness of from $\frac{3}{8}$ to $\frac{1}{2}$ inch but are at least substantially thinner than a conventional brick. The tiles once set, which is preferably achieved by the application of pressure and/or heat are adhered to the face of the first sheet which is formed of a suitable impervious material such as asbestos cement sheeting which has been guillotined to the exact dimensions required. The mortar line pattern is provided by screening an appropriate slurry into the spaces between the brick tiles either before or after their application to the first sheet.

The second sheet may be formed of any suitable insulating material, however, polystyrene foam has been found to be the material of preference. The polystyrene foam is adhered to the back face of the first sheet and is dimensioned such that it is shorter and narrower than the first sheet. As the third sheet has the same height and effective width as the first sheet a recess is formed about the four sides of the second sheet and bounded by the first and third sheets.

The third sheet is formed from any suitable internal cladding materials such as compressed particle board or fibrous plaster or plaster board of the type provided with a cardboard facing. If the edges of the first sheet are recessed to correspond with a brick like pattern then the effective width of the first sheet will be the distance between the protrusion on one side of the first sheet and the corresponding recess on the other side. In order to ensure that the third sheets of adjacent building panel abut it is essential that the width of the third sheet be equal to the effective width of the first sheet. While it is essential that the top and bottom edges of the third sheet are in alignment with the top and bottom edges of the first sheet it is not essential that the side edges of the third sheet are necessarily aligned with the side edges of the first sheet. Provided that the first and third sheets are dimensioned appropriately and that all building panels are formed in a corresponding way then

abutment of the first sheets of adjacent building panels will automatically cause abutment of the corresponding third sheets.

- The U-section members are disposed one on each side of the second sheet between the first and third sheets. The members are preferably formed from sheet metal and are connected to the second sheet by an adhesive or any other similar connecting means. Engagement means are provided longitudinally along the length of each U-section member to allow the U-section members of adjacent building panels to be connected together. In a preferred embodiment of the invention one arm of the U-section member is formed with a longitudinal recess and the other arms with a corresponding rib. The rib and recess are so arranged and dimensioned that when two building panels are pushed together in edge to edge relationship the rib of each U-section member will engage within the recess of the other U-section member. Such an arrangement provides a waterproof seal between the adjacent building panels and will maintain the adjacent panels in abutting edge to edge relationship. It is desirable that the U-section members be so formed that a single pressing or extrusion can be used on both edges of the building panel. If the recess formed between the first and third sheets due to the narrower dimension of the second sheet should be so dimensioned that the arms of the U-section member, or at least one of them, extends across the line of abutment between the first sheets of adjoining building panels. In one preferred arrangement the U-section member is formed with one arm longer than the other, the longer arm extending substantially across the line of abutment between adjacent building panels while the other arm stops short of that line. In this arrangement the long arm of one U-section member will engage with the short arm of the U-section member of an adjacent building panel and therefore the lines of engagement between the ribs and grooves of the respective U-section members will be offset from one another across the line of abutment between adjacent building panels.

- When the building panels according to the present invention are formed up into a building construction a floor is formed of wood or concrete and the ribs are placed or formed on the floor corresponding to the lines of the walls of a construction. The ribs are so dimensioned as to fit neatly within the recess provided between the first and third sheets of a building panel. A first panel is then fitted over the rib on the floor and the next adjacent panel brought up and simultaneously fitted over the rib and brought into abutting engagement with the first building panel. Once a wall has been formed in this manner a top plate can then be placed in the recess formed at the upper edge of the building panels between the first and third sheets thereof. The top plate will rest on the second sheet of each building panel. The rib can then be connected to the top plate by a steel rod extending longitudinally through one of

the U-section members. The steel rod may be embedded in the floor or may be connected thereto and preferably extends through the top plate and is held in place by a nut which engages with a threaded end section of the steel rod.

Hereinafter given by way of example only is a preferred embodiment of the present invention described with reference to the following drawings in which:—

- Fig. 1 is a side elevational view of a building panel according to this invention with the U-section members displaced outwardly from the panel;

Fig. 2 is a plan view of two building panels according to Fig. 1 connected together in line;

Fig. 3 is a plan view of the building panel of Fig. 2 with the U-section members removed;

Fig. 4 is a plan view of two building panels according to Fig. 1 connected together at right angles to one another;

Fig. 5 is an exploded perspective view of a building construction according to the present invention.

- The building panel 10 comprises a first sheet 11, a second sheet of insulating material 12, a third, lining sheet 13 and a pair of U-shaped sheet metal members 14.

- The first sheet comprises a sheet of asbestos cement material 15 which has formed on its surface a pattern of brick-like tiles 16. The tiles 16 are formed on the surface of the asbestos cement sheet 15 by placing over the sheet 15 a grid like template defining an array of apertures corresponding in shape and spacing to the desired array of brick-like tiles. A slurry of natural granular particulate matter such as sand, clay, stone chips and the like together with a suitable organic or inorganic binder are screeded over the template and the template removed. The asbestos cement sheet 15 and the array of brick-like tiles are then passed into an oven to set the binder and to affix the brick-like tiles firmly to the asbestos cement sheet. The asbestos cement sheet is then guillotined to the shape of the brick-like tiles along each edge. The first sheet 11 is then formed with a series of protuberances and recesses which will interdigitate with corresponding protuberances and recesses of another building panel.

- The second sheet 12 of polystyrene foam is glued to the back of the first sheet 11. The second sheet 12 is shorter and narrower than the first sheet 11 and is arranged on the first sheet such that there is a recess around the edge of the panel 10 between the first sheet 11 and the third sheet 13.

- The third sheet 13 is preferably formed of a suitable lining material such as plasterboard which can be adhered to the back of the second sheet 12.

- The U-shaped sheet metal members 14 are formed with a base portion 17 and a pair of side arms 18. Each side arm is formed with a longitudinally extending indentation 19. The indentations 19 are so arranged that when two U-shaped members are pushed together the rib

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formed by the indentation 19 of one U-shaped member will engage in the recess formed by the corresponding indentation 19 of the other U-shaped member. The U-shaped members 14 of the building panel 10 are arranged on each side of the panel in back-to-back array within the recess formed between the first panel 11 and the third panel 13 and are glued in place.

As is seen in Fig. 5 the building construction according to this invention is formed from a floor 21 on which are ridge lines 22 which serve to locate a plurality of building panels 10. The building panels 10 are held in place by top plates 23 which are connected through the corresponding ridge lines 22 to the floor 21 by tie rods 24.

The floor 21 is formed as a concrete slab reinforced in conventional manner. The ridge lines 22 are simply formed by bolting wooden beams to the floor. When pouring the slab it is desirable to include bolts or other anchorages for the tie rods 24.

In building the construction the panels are in turn placed over the ridge lines 22 and slid along to engage the U-section members 14 of adjoining panels 10. The top plate 23 is then placed in position over the tie rod 24 and a nut 25 threaded down onto the tie rod. If desired a bracket 26 may be placed over the tie rod 24 to which roof trusses 27 may be affixed.

It will be appreciated that internal walls and ceilings may be included in a building construction according to this invention using conventional materials or building panels according to this invention.

CLAIMS

1. A building panel comprising a first substantially rectangular sheet of a water impervious material; a second sheet of insulating material adhered to one face of the first sheet, the second sheet being substantially thicker than the first sheet and being shorter and narrower than the first sheet; a third sheet adhered to the face of the second sheet distal to the first sheet, the third sheet being substantially thinner than the second sheet and being of the same height and effective width as the first sheet; and a pair of substantially U-section members, one of which is connected to each side edge of the second sheet between the first and third sheets and extending along substantially the full height of the said second sheet, the U-section members each opening outwardly of the second sheet and being formed with longitudinally extending engagement means to engage with a corresponding engagement means on the U-section member of another building panel to hold the panels in edge to edge engagement with the respective first and third

60 sheets of the panels abutting and flush with one another.

2. A building panel as claimed in Claim 1 in which the outer surface of the first sheet is provided with an array of brick like tiles disposed in a conventional brick work array.

65 3. A building panel as claimed in Claim 2 in which the brick like tiles in adjacent courses are offset relative to one another by a half tile length and the side edges of the first sheet are recessed each second course to correspond to the pattern of the tiles.

70 4. A building panel as claimed in Claim 2 or Claim 3 in which the brick-like tiles are formed from a slurry of natural granular materials and chemical adhesives and are, after drying under heat and/or pressure adhered to the first sheet.

75 5. A building panel as claimed in Claim 1 in which the second sheet is formed from polystyrene foam.

80 6. A building panel as claimed in Claim 1 in which the U-section members are formed from sheet metal.

7. A building panel as claimed in Claim 1 in which the U-section members are each formed with a recess extending longitudinally along the length of one arm and a corresponding rib extending longitudinally along the other arm, the rim and recess constituting the engagement means of the U-section member.

8. A building panel as claimed in Claim 7 in which one arm of the U-section member is longer than the other, the longer arm extending beyond the notional line of contact between the building panel and an adjoining similar building panel while the shorter arm stops short of that notional line.

95 9. A building panel substantially as hereinbefore described with reference to the accompanying drawings.

10. A building construction comprising a floor having longitudinally extending upstanding ridges corresponding to the positions of the walls of the building construction and a plurality of building panels according to this invention disposed above the said ridges with the first and third sheets of the building panel engaging the floor and bounding a ridge on each side, adjacent building panels abutting with one another with the engagement means of the adjacent U-section members in engagement with one another, a top plate extending along the length of the walls and being received between the first and third sheets of each building panel, each top plate being interconnected with the corresponding ridge by elongate rod members extending longitudinally within a U-shaped member of one of the building panels.

115 11. A building construction substantially as hereinbefore described with reference to the accompanying drawings.

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